higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

INDUSTRIAL ELECTRONICS N1

6 AUGUST 2019

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
1.1.1 F
1.1.2 K
1.1.3 J
1.1.4 P
1.1.5 L
1.1.6 D
1.1.7 N
1.1.8 E
1.1.9 H
1.1.10 I

(10 × 1) (10)

1.2 1.2.1

$$R_2 // R_4 = \frac{6 \times 4}{6+4} \checkmark$$
$$= \frac{24}{10} \checkmark$$
$$= 2,4\ \Omega \checkmark$$

$$R_2 + R_{//} + R_5 = 8 + 2,4 + 10 \checkmark$$
$$= 20,4\Omega \checkmark$$

$$R_t = \frac{20,4 \times 24}{20,4+24} \checkmark$$
$$= \frac{489,6}{44,4} \checkmark$$
$$= 11,027\ \Omega \checkmark$$

(8)

1.2.2

$$I = \frac{V}{R} \checkmark$$
$$= \frac{12}{11,027} \checkmark$$
$$= 1,088A \checkmark$$

(3)

1.2.3

$$P = V \times I \checkmark$$
$$= 12 \times 1,088 \checkmark$$
$$= 13,056W \checkmark$$

(3)

1.3 Blue; black; brown (3)

[27]

QUESTION 2

2.1 2.1.1 Internal resistance of one $= \frac{1,5}{3} = 0,5\Omega$ ✓✓ (2)

2.1.2 $R_T = R + r = 25 + 1,5 = 26,5\Omega$ ✓✓ (2)

2.1.3

$$I = \frac{E}{R+r} \checkmark$$
$$= \frac{4,5}{25+1,5} \checkmark$$
$$= 0,1698A \checkmark$$

(3)

2.1.4

$$V = E - (I \times r) \quad \checkmark$$
$$= 4,5 - (0,1698 \times 1,5) \quad \checkmark$$
$$= 4,245V \quad \checkmark$$

OR

V = I × R ✓
= 0,1698 × 25 ✓
=4,245 V ✓

(3)

2.2

$$R_T = R_0(1 + \alpha \times \Delta t) \quad \checkmark$$
$$= 5(1 + 0,0059 \times 60) \quad \checkmark$$
$$= 6,77\Omega \quad \checkmark$$

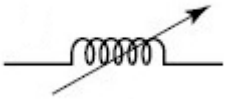
(3)

2.3

- Number of turns
- Current flowing through the coil
- Type of core material
- Ratio of coil length to diameter

(4)

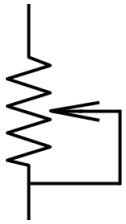
2.4 2.4.1



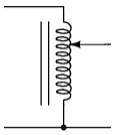
2.4.2



2.4.3



2.4.4



2.4.5



(5 × 1) (5)

2.5
- Relatively inexpensive (cheap)
- Readily available
- Physically small in size
- Easy to install
- Various sizes available (Any 3 × 1) (3)

[25]

QUESTION 3

3.1 3.1.1
A
A
B
D
D
C
C
B
A
C

(10 × 1) (10)

3.2
$$l = \frac{Ra}{p} \quad \checkmark$$
$$= \frac{10 \times 0,000010}{0,0159 \times 10^{-6}} \quad \checkmark$$
$$= \frac{1 \times 10^{-4}}{1,59 \times 10^{-8}} \quad \checkmark$$
$$= 6289 \text{ meters} \quad \checkmark$$ (4)

3.3
- Length
- Cross-sectional area
- Temperature
- Type of material (4)

3.4
- The greater the length the greater the resistance.
- The higher the temperature, the greater the resistance.
- The larger the area, the less the resistance.
- The more free electrons the material has, the less the resistance. (4 × 2) (8)

[26]

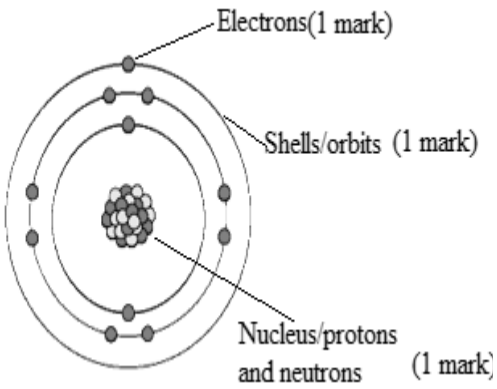
QUESTION 4

4.1 4.1.1 No losses
4.1.2 Semiconductors
4.1.3 Digital
4.1.4 Voltage regulator
4.1.5 Relative density
4.1.6 Ability
4.1.7 One
4.1.8 Ion
4.1.9 Repel
4.1.10 Positive

(10 × 1) (10)

4.2 4.2.1

NB: Electrons must be distributed correctly to obtain THREE marks/ ONE mark for each shell



(6)

4.2.2 Conductor (1)

4.3 4.3.1 False
4.3.2 False
4.3.3 False
4.3.4 False
4.3.5 False

(5 × 1) (5)
[22]

TOTAL: 100

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